

West Virginia Point Source Emissions Inventory Two Steps Forward, One Step Back

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ABSTRACT

With advances in database technology and internet capabilities, we are able to do much more with data than we could a short time ago. As we get better at electronic data handling, what are we losing? Emissions calculations are no longer performed by agency engineers, but rather, by the regulated facilities. The level of Quality Assurance performed must evolve to catch up with the data gathering techniques, and more importantly, we must learn to better analyze the data, to find the useful information hidden within.

INTRODUCTION

The WV Division of Air Quality is losing expertise in two critical areas. First, employees who have been with the agency since the early 1970's are retiring and taking with them a great deal of knowledge concerning many of the issues, rules, successes, and failures of the past. Second, and more importantly from an emissions inventory point of view, we will be losing a sense of perspective, which has been developed over several years, of what the data actually means. WV can now gather and forward data in a fairly efficient manner. Our new goal should be to learn how to better interpret and QA the data, using the technology at hand.

WV POINT SOURCE INVENTORY

Where we were

Before 1994, WV gathered all inventory data on paper and performed many of the required calculations for the development of the point source inventory. As more permits and enforcement actions were required, the time spent on inventories decreased. Between 1990 and 1994, our inventory staff had only one person dedicated full-time to point source inventory work. Data was warehoused, but was only minimally checked for completeness or quality. So much time was spent on the 1990 periodic inventory that no inventory data other than 1990 was submitted to EPA for several years.

In 1994, WV began requiring electronic submittals of both Emissions Inventory reports and Title V permit applications in an effort to gather the needed data in a more efficient manner. Inventory data collection initially consisted of mailing software to the regulated facilities, with directions on submitting a data diskette to our office. The agency offered training classes that covered software installation and usage, and provided guidance on which data elements were necessary for a submittal to be accepted. When diskettes arrived at our office, the information was uploaded to a central database and stored.

In 1996, the staff dedicated to Point Source inventories doubled. Now that there were two of us, we attempted to address the backlog of emission inventories which had been collected since 1993, but had not been submitted to EPA. By the end of 1998, with the help of an intern, we had eliminated the backlog. However, the data had not been quality assured, beyond minimal data completeness checks.

Our efforts to gather and submit data in a more timely manner, while successful, resulted in a failure to look at the data in more detail.

Where we are

Since getting the backlog taken care of, we have begun to refine the process. Our mail-out is now simply a notification of when submittals are due and where on our website the software and guidance can be obtained. Guidance includes information on data entry procedures, HAP speciation, links to various EPA emission estimation tools, and a discussion of common reporting errors.

When the data arrives at our office, there are several QA steps which are performed prior to importing the data into the master database. We are fortunate to have database programmers in our group who have been able to write QA routines. First, there is a check to see if the database contains orphan records or incomplete data entries. Next is a check to see if all pollutants required in a submittal are included. (For example, a submittal may list Total Particulate Matter but not PM10, or may not have addressed HAPs). We also check to see if the data shows abnormal peaks or valleys for each pollutant reported. Finally, the data is checked to see if the pollutant totals reported on the Title V Certified Emission Statement, upon which the Title V fees are based, match those in the inventory. If discrepancies are found, the facility is contacted and required to adequately explain them, or correct and resubmit the inventory.

After all inventories have been received, we check the modeling data (physical location and stack parameters) for missing or unreasonable data, and for internal consistency. The companies are contacted as necessary for resubmittal or data verification.

The data is put into the NEI input format using a converter we developed in Microsoft Access 97. If the data is requested by EPA or other interested parties, it can be supplied in a spreadsheet, database, text file, etc., or in the NEI input format.

Using this system our present timetable is approximately:

- Request for inventory submittals – January
- Submittals due to our office – June
- QA'd data ready for submittal – September
- Delinquent sources given to enforcement – October

Where we are going

Our future goals are to move to internet-based submittals of inventories, permit applications, and fees using a single system, instead of the multiple isolated databases now in use. This system is currently in development, and Phase I (for permit application submittals) is expected by January, 2003.

There are several advantages we hope to gain when the new system comes online.

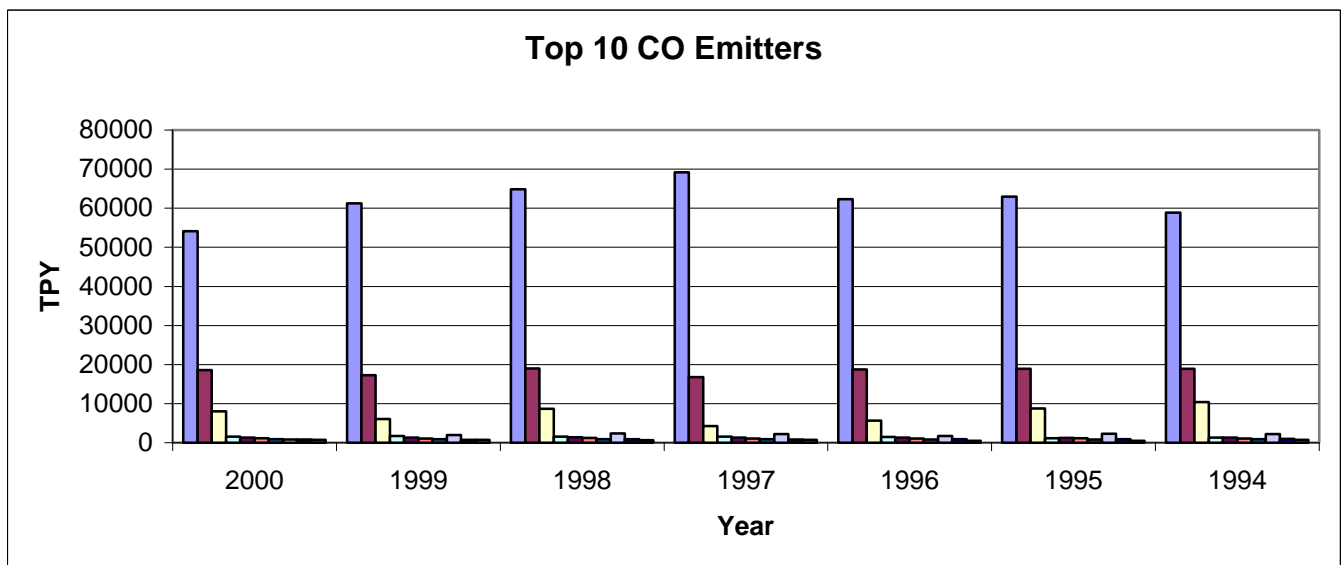
- Since the permitting and inventory data will exist online, a permit applicant or inventory submitter will be able to update the database directly, instead of having to start from scratch.
- Permitting data and inventory data will use identical emission unit identifications, as the data will be housed in a single database. This will eliminate the current inconsistencies which have prevented us from making useful comparisons between the databases.
- We hope to use the NEI input format as much as possible in developing the structure for the emission inventory portion of the system. This should simplify the process of uploading data to EPA.
- The existing emission inventory does not address potential or allowable emissions. While some of this data can be found in the permitting database, it can be difficult to match emission inventory sources to permitted units. Having the data readily available will simplify NAAQS and increment consumption modeling.

- Permit engineers, inventory staff, and facility personnel will all be using the same software and data.
- FOIA requesters will be able to get permitting and inventory data from the internet without requiring our help, and without incurring the related personnel and copying costs.
- Time saved on data collection can be put to use doing improved QA.

This all sounds very modern and efficient. However, our procedural improvements so far have been geared toward data processing, not interpretation and analysis. Resources have not been committed to analyzing trends and air quality impacts. One issue we are now facing is that, since we no longer perform the emission calculations by hand, we have lost a feel for the quality of the data. We need to regain that, while still maintaining the advances we have made.

Rather than go back to hand calculations, we have been developing QA techniques that are better suited for the our electronic data handling procedures. Some simple preliminary data trend analysis shows how misleading the data can be.

Figure 1.



For example, Figure 1 shows the top 10 CO emitters in WV from 1994 to 2000. The trend analysis identified a facility with CO emissions about 3 times as large as the second largest facility in the state. At first glance, it appeared that this facility may have seriously over-reported CO emissions. Before having a chance to query the data in more detail and contact the source, we spoke with one of our senior engineers, who has been with this agency for over 30 years. When we showed him this graph, he told us immediately who the source was, and why the emissions were so high. That is the kind of soon-to-be-lost expertise we hope to regain by investigating the data.

Figure 2.

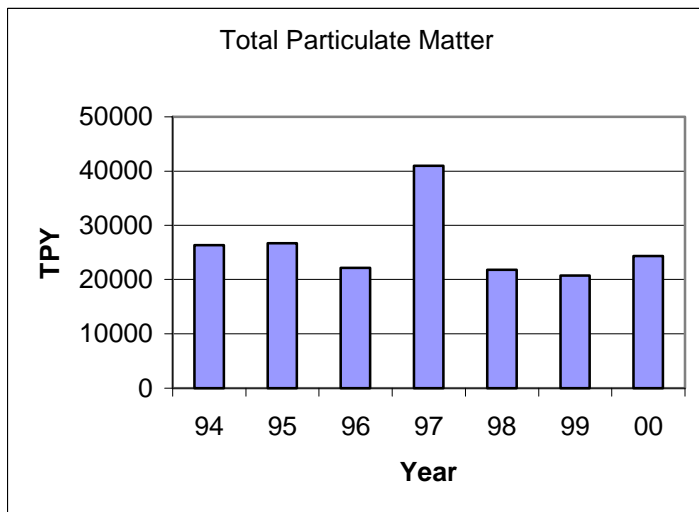


Figure 2 is the result of a trend analysis for statewide Total Particulate Matter, which uncovered an anomaly for 1997 that we had failed to notice previously. A closer look at the underlying data revealed that a power plant had over-reported particulate emissions by about 350%. Even though no one in the inventory group had personal knowledge of the size of each plant, the trend analysis helped the group to identify a potential problem, then zero in on the probable culprit.

Figure 3.

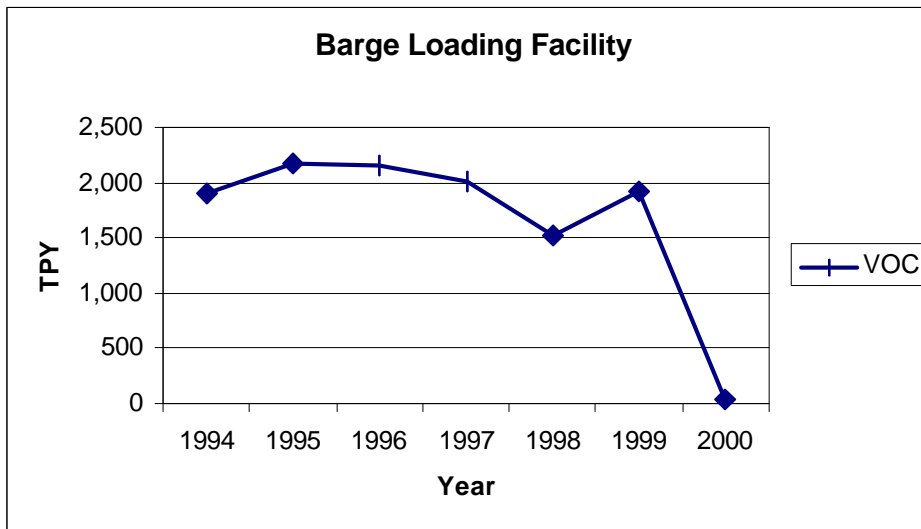


Figure 3 shows VOC emissions from a petroleum terminal, as reported over several years. Initially, we thought that there may have been an error in the 2000 data, as the VOC emission was so much lower than before. Actually, the emissions for 2000 were correct, as a control program had been established in late 1998 resulting in about 98% control at a barge loading operation. The actual error turned out to be in the data for 1999. The reported emission of about 1900 TPY should have been about 60 TPY. The submitter entered the controlled emission correctly, but then also entered the uncontrolled emission into a separate record, which resulted in both numbers being added into the total.

Figure 4.

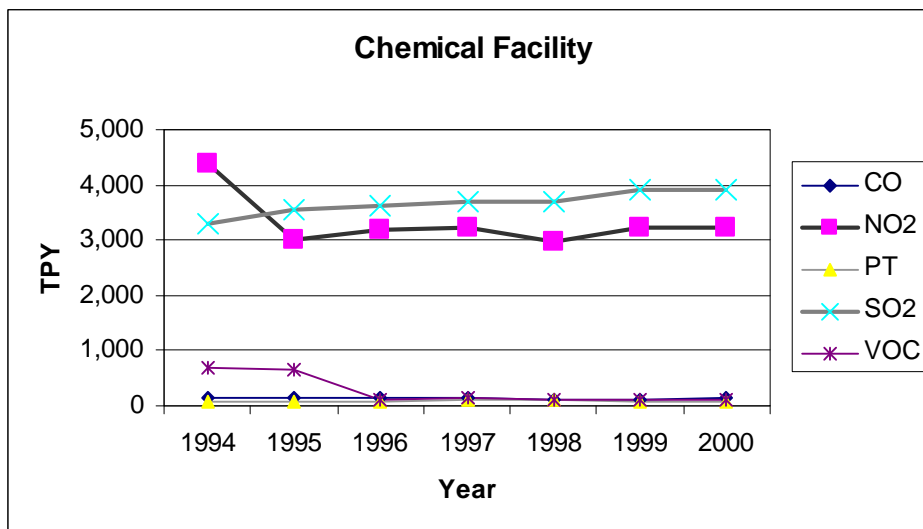


Figure 4 shows criteria emissions from a large chemical plant. Emissions seem relatively stable since 1995, but it appears that there was a sudden drop in NO₂ emissions from 1994 to 1995, while there was not a corresponding drop in the other pollutants. Further analysis revealed that the apparent NO₂ reduction occurred at 3 pulverized coal fired boilers, while coal usage stayed about the same. It turned out that in 1994, an emission factor for wet bottom boilers was used instead of the factor for dry-bottom boilers, resulting in about a 1200 TPY overestimate for NO₂.

Figure 5.

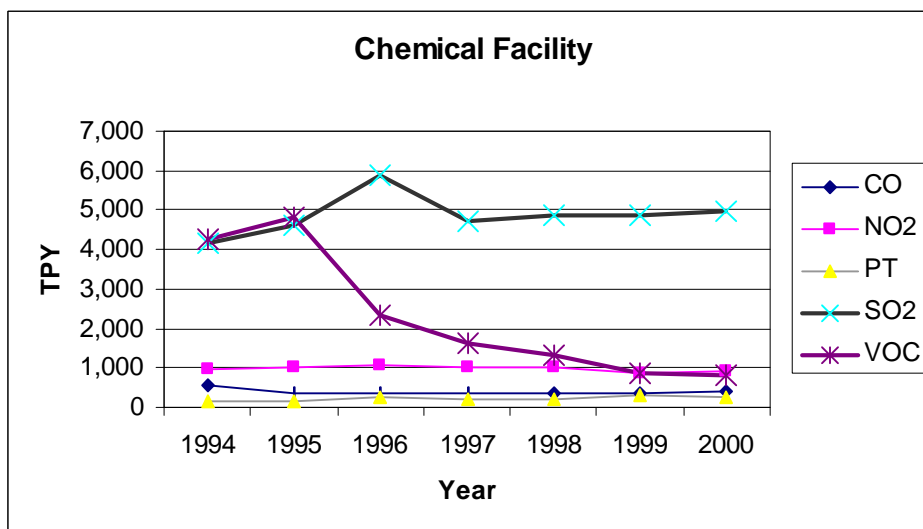


Figure 5 shows the criteria emissions from another large chemical plant. While CO, PT, and NO₂ emissions appear relatively stable, there is a large one-year increase in SO₂ for 1996, which drops again in 1997 and remains steady thereafter. Determining the reason for this was complicated by the fact that the facility held boiler firing rates confidential. We do not enter confidential data into our master database, so the information had to be retrieved from the corresponding diskettes containing the confidential information. After retrieving this data, we still could not account for the increase, as the process rates had not changed much. Then it was noticed that the reported sulfur content of the coal increased for 1996. Factoring in the sulfur content with the process rates explained the one-year increase in SO₂.

Figure 6.

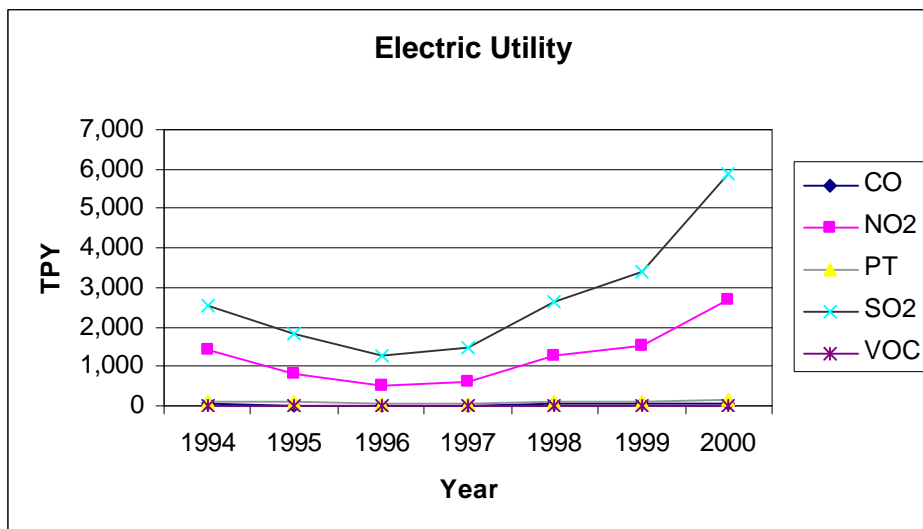


Figure 6 shows criteria emissions from a power plant. This is the type of pattern we would expect from a simple combustion source, where the only significant variable over the period was the amount of coal burned.

Figure 7.

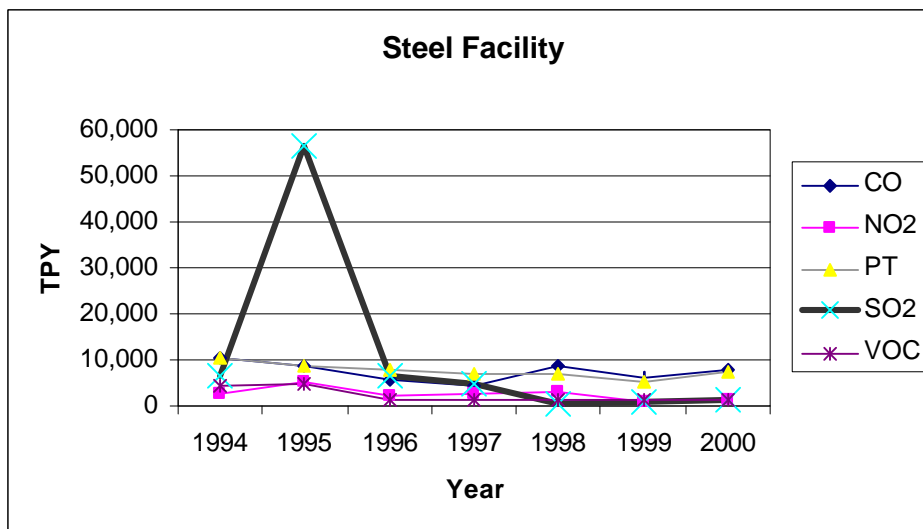


Figure 7 shows an enormous one-year spike in SO2 emissions reported for a steel mill. Analysis of the process rates showed what may be a discrepancy for three natural gas fired boilers which also burn blast furnace gas. For 1995, each was reported to have burned over 30 billion cubic feet of this gas, while the reports for all the other years show a rate of 3 million cubic feet (a factor of 10,000 difference). Another senior engineer was consulted, and he said that the high number was not reasonable. We will be investigating this further.

Figure 8.

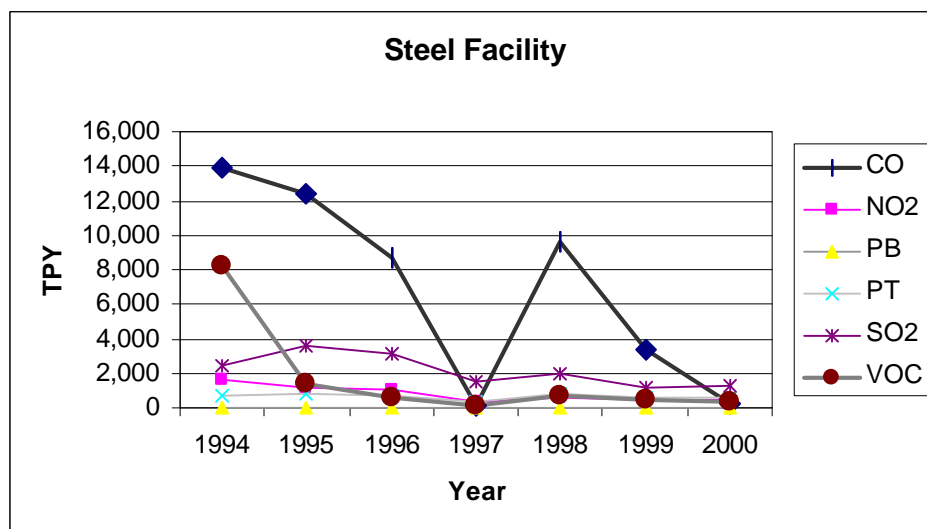


Figure 8 shows another steel facility. Emissions of CO from the largest CO source at this facility were calculated using a built-in emission factor in our emission inventory software. For years 1997 and 2000, the process rates for this source were reported as zero. For all the other years, the process rates were several hundred thousand tons per year. The senior engineer we spoke to about the other steel facility confirmed that the process was idle for 1997 and 2000.